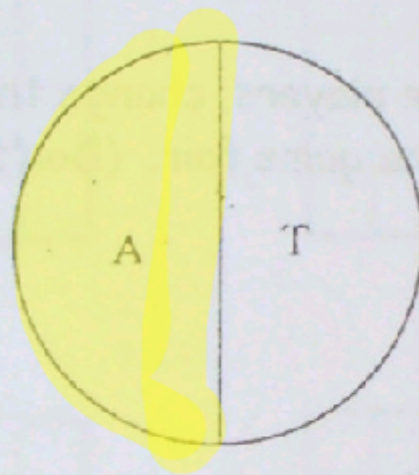


Area Model and Expected Value Review.

Another Spinner Game

Todd and Amy decided to make a game with a spinner. The spinner is shown below. They decided that if it lands on the region marked with a T, Todd wins \$2. And if it lands on the region marked with an A, Amy wins \$2.



50% Chance
2 \$

win

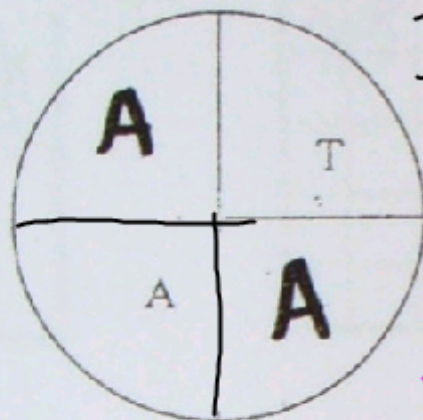
$$\frac{50}{100} \times \$2 = \frac{\$100}{100} \text{ spins} = A \& T$$

$$\text{Lose } \frac{50}{100} \times \$2 = \frac{\$100}{100} \text{ spins } A \& T$$

1. If they were to play (spin) a hundred trials, how much money does each person expect to win? How much do they expect to lose?
2. Do you think this is a fair game for both of them? Why or why not?

- Yes, same expected value, 1

Amy and Todd decide to make the game more interesting, and they change the way the spinner looks as well as how much they pay each other. Amy now wins \$2 if it lands in her area, and Todd wins \$6 if it lands in his area.



$$\frac{75}{100} \cdot 2 = \frac{150}{100} = \frac{15}{10} = \$1.50$$

$$\frac{25}{100} \cdot 6 = \frac{150}{100} = \frac{15}{10} = \$1.50$$

$$\frac{3}{4} \times 2 = \frac{6}{4}$$

$$\frac{1}{4} \times 6 = \frac{6}{4}$$

1. If they were to play (spin) a hundred trials, how much money does each person expect to win? How much do they expect to lose?
2. What is there average number of points per spin (Expected Value) if they spun 100 times?
3. Do you think this is a fair game for both of them? Why or why not?
4. How could you change to amount each wins to it is a fair game?

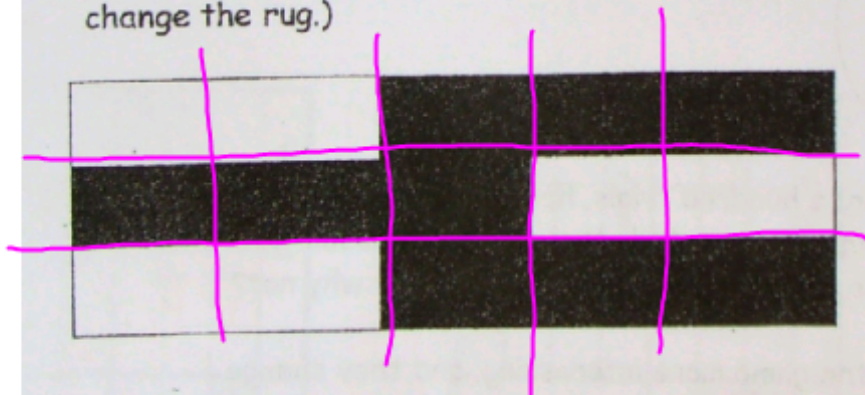
Yes, because their expected values are the same

A fair rug game?

Tony and Crystal are sitting around a rug watching darts randomly fall from the ceiling. The rug they are using is pictured below. If the dart lands on the white part of the rug, Crystal wins \$5 from Tony. If it lands on the black part, Tony wins \$3 from Crystal.

Do you think this is a fair game? What is Tony's expected value for each turn? What's Crystal's?

If you think that the game is not fair to one of the players, change the amount of money they each win in order to make the game fair. (Don't change the rug.)



$$\text{Black} = \frac{6}{15} \times \$3 = \$\frac{18}{15}$$

$$\text{White} = \frac{6}{15} \times \$5 = \$\frac{30}{15}$$

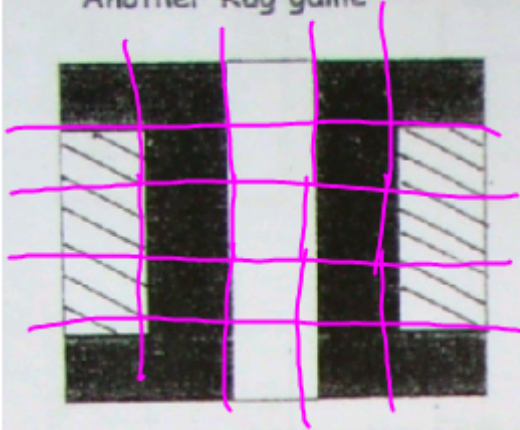
No, the expected values for Crystal is higher, $\frac{30}{15}$

$$4 \quad 9 \times 4 = \frac{36}{15}$$

$$4 \quad \$3 \times 4 = \$\frac{12}{15}$$

$$6 \times 6 = \frac{36}{15}$$

Another Rug game



Grey: 15 points
 White: 10 points
 Black: 5 points

Capture a user defined rectangle.

Similar to other Rugs (Area Models) that you have seen, a dart falls randomly somewhere on the rug.

1. Calculate the probability of the dart landing on each of the colors.
2. Using the probabilities, decide on how many points each color would "receive" if the dart were to drop 100 times.
3. If a person were to drop a dart on this rug many times, how many points would a person expect to get on each drop?

$$\begin{aligned} \text{Black} &- \frac{14}{25} \times 4 = \frac{56}{100} \times 5 = \frac{280}{100} \text{ pt drops} \\ \text{White} &- \frac{5}{25} \times 4 = \frac{20}{100} \times 10 = \frac{200}{100} \\ \text{Grey} &- \frac{6}{25} \times 4 = \frac{24}{100} \times 15 = \frac{360}{100} \end{aligned}$$

avg 2.8 pts

avg 2 pts

avg 3.6 pt

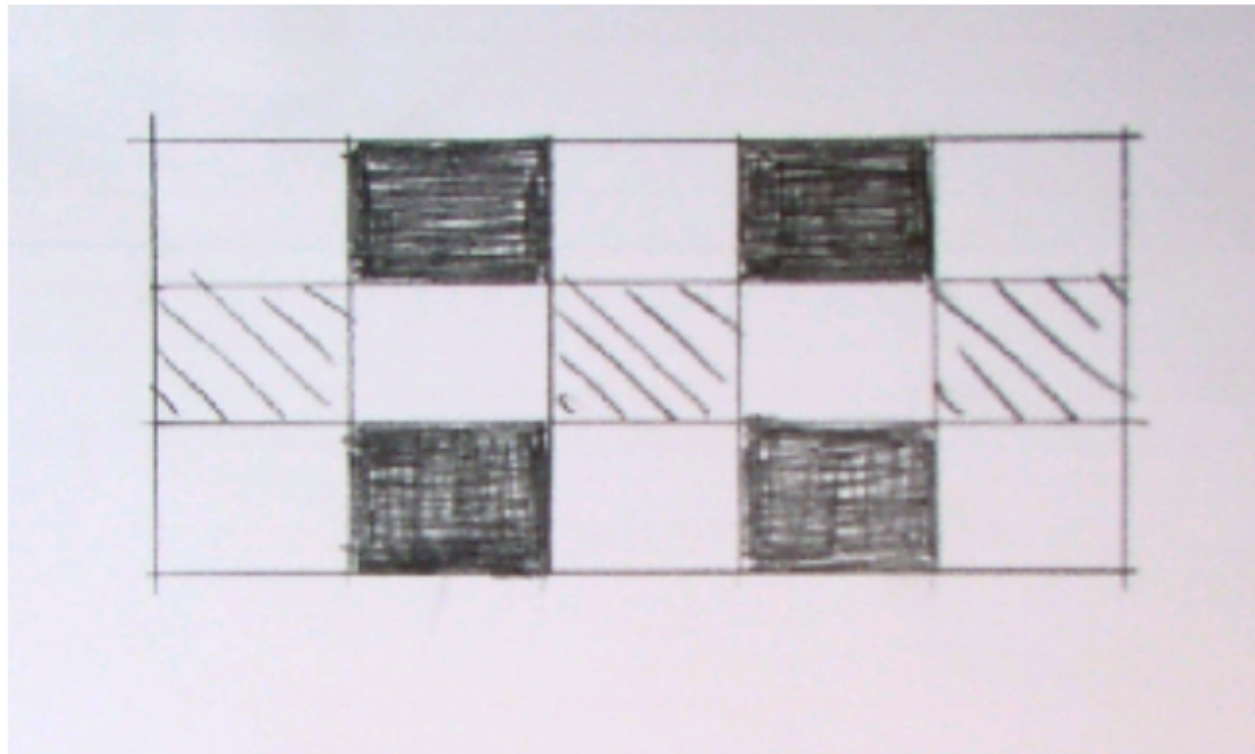
of points
 per color
 for 100 drops

8.4

avg for
 total band

Similar to other Rugs (Area Models) that you have seen, a dart falls randomly somewhere on the rug.

1. Calculate the probability of the dart landing on each of the colors.
2. Using the probabilities, decide on how many points each color would "receive" if the dart were to drop 100 times.
3. If a person were to drop a dart on this rug many times, how many points would a person expect to get on each drop?



Black - 5 pts
Grey - 6 pts
White - 3 pts

Quiz